Two new species of the *Macrophya flavomaculata* group (Hymenoptera: Tenthredinidae) from China

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Abstract: Two new species of the *Macrophya flavomaculata* group from Zhejiang and Taiwan, China are described, namely *M. hejunhuai* Li, Liu & Wei sp. nov. and *M. lalashanica* Li, Liu & Wei sp. nov. The type specimens of these new species are deposited in the Insect Collection of Central South University of Forestry and Technology, Changsha, Hunan, China.

Key words: Symphyta; Tenthredinoidea; taxonomy; sawflies

中国钩瓣叶蜂属黄斑钩瓣叶蜂种团两新种（膜翅目：叶蜂科）

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摘要：记述中国浙江和台湾钩瓣叶蜂属黄斑钩瓣叶蜂种团 *Macrophya flavomaculata* group 2 新种：何氏钩瓣叶蜂 *M. hejunhuai* Li, Liu & Wei sp. nov. 和拉拉山钩瓣叶蜂 *M. lalashanica* Li, Liu & Wei sp. nov.。新种模式标本保存于中南林业科技大学昆虫模式标本室。

关键词：广腰亚目；叶蜂总科；分类；叶蜂

Introduction

Macrophya Dahlbom, 1835, the third largest genus in the subfamily Tenthredininae (Hymenoptera: Tenthredinidae) contains 298 species worldwide (Li & Wei 2013; Li *et al*. 2013a, b, c, 2014a, b, 2016a, b, 2017a, b, 2018a, b, c, d; Liu *et al.* 2015a, b, 2016a, b, 2017a, b, 2018; Shinohara 2015; Shinohara & Li 2015; Shinohara & Yoshida 2015; Taeger *et al*. 2010; Wei *et al.* 2006, 2013; Xie *et al.* 2018). In China, 159 *Macrophya* species have been recorded

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(Li *et al*. 2012, 2013a, b, c, 2014a, b, 2016a, b, 2017a, b, 2018a, b, c, d; Li & Wei 2012, 2013; Liu *et al.* 2015a, b, 2016a, b, 2017a, b, 2018; Taeger *et al*. 2010; Wei *et al.* 2006, 2013; Wu *et al*. 2012; Xie *et al.* 2018; Zhang & Wei 2006; Zhao *et al.* 2010a, b; Zhao & Wei 2011; Zhu & Wei 2009; Zhu *et al*. 2012).

The *M. flavomaculata* group is a medium-sized group of *Macrophya*, including 14 species and 2 subspecies occurring all over the world. They are *M. acuminiclypeus* Zhang & Wei, 2006 from China, *M. coloritibialis* Li, Liu & Wei, 2016 from China, *M. falsifica* Mocsáry, 1909 from Japan, *M. flavomaculata* (Cameron, 1876) from China, *M. fraxina* Zhou & Huang, 1980 from China, *M. khasiana* Saini, Bharti & Singh, 1996 from India, *M. manganensis* Saini, Bharti & Singh, 1996 from India, *M. parviserrula* Chen & Wei, 2005 from China, *M. quadriclypeata* Wei & Nie, 2002 from China, *M. satoi* Shinohara & Li, 2015 from Japan, *M. transmaculata* Li, Liu & Wei, 2018 from China, *M. verticalis* Konow, 1898 from China, North Burma and North Vietnam (including *M. v. verticalis* Konow, 1898 from North Vietnam and *M. v. tonkinensis* Malaise, 1945 from China and North Burma), *M. zhengi* Wei, 1997 from China and *M. zhui* Li, Liu & Wei, 2016 from China (Cameron 1876; Konow 1898; Mocsáry 1909; Forsius 1925; Malaise 1945; Zhou & Huang 1980; Saini, Bharti & Singh 1996; Wei 1997; Wei & Nie 2002; Chen *et al.* 2005; Zhang & Wei 2006; Li *et al*. 2018b; Liu *et al*. 2016b). Eight species of this group are reported in China.

In this study, two species in this group from Zhejiang and Taiwan in China are described as new to science.

Material and methods

Specimens were examined with a Motic-SMZ-168 stereomicroscope. Adult images were taken with a Nikon D700 digital camera and the series of images were montaged using Helicon Focus (©HeliconSoft). All images were further processed with Adobe Photoshop CS 11.0®.

Morphological descriptions of this new species are based on the holotype. The terminology of genitalia follows Ross (1945) and the general morphology follows Viitasaari (2002), and for a few terms (e.g. middle fovea and lateral fovea) we follow Takeuchi (1952).

The specimens examined in this study, including the holotype and paratypes of these new species, are deposited in the Insect Collection of Central South University of Forestry and Technology, Changsha, Hunan, China (CSCS).

Taxonomy

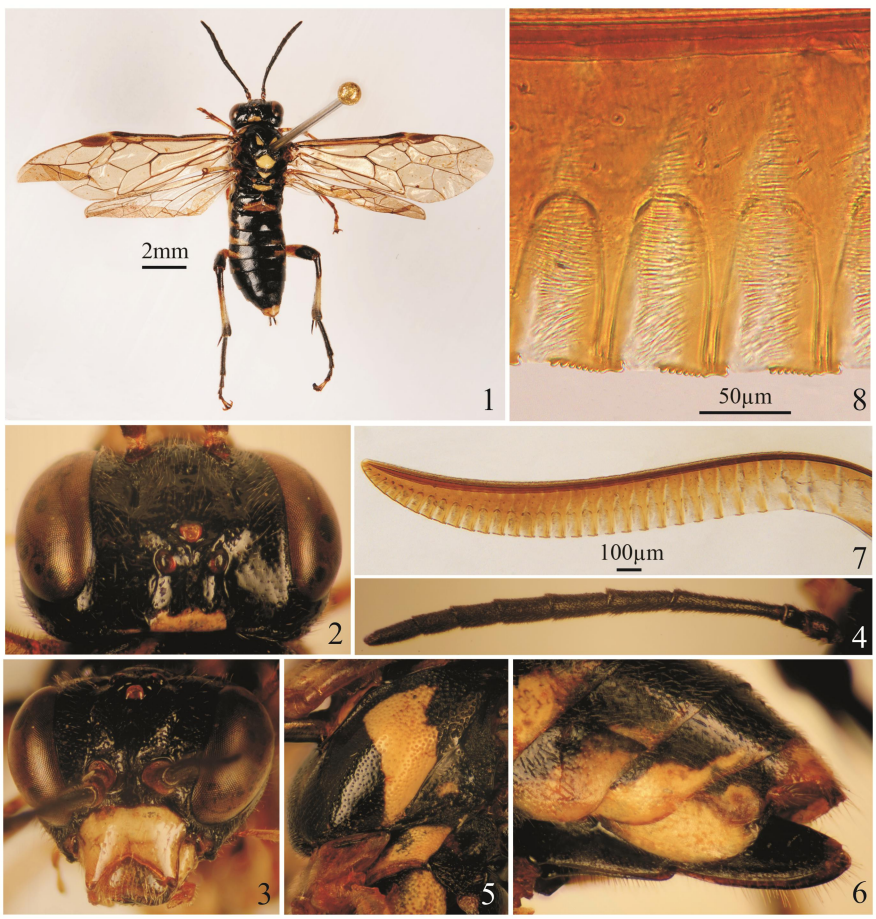
The *Macrophya flavomaculata* group

Diagnosis is provided by Li *et al*. (2018b) and Liu *et al*. (2016b).

1. ***Macrophya lalashanica* Li, Liu & Wei sp. nov.** (Figs. 1–8)

Female. Body length 10 mm. Body largely black; following parts yellow to yellowish brown: palp, basal half of mandibles, labrum, clypeus, posterior margin of postocellar area and two lateral sides with narrow cross maculae, scape except for outer side with black maculae,

posterior margin and lateral margins of pronotum, one double triangular small maculae on inner side of median mesoscutal lobes, mesoscutellum, mesoscutellar appendage, cenchrus, metascutellum, outer margins of tegula, a large macula at center of mesepisternum, a small macula at center in anterior margin of katepimeron, metepisternum, a small macula at center of metepimeron, broad bands on posterior margin at center and two lateral sides with small maculae of abdominal tergum 1, two lateral sides with long maculae of abdominal terga 2–8, two lateral sides largely of abdominal tergum 9 and abdominal tergum 10 entirely. Legs largely yellowish brown; following parts black: basal margins of all coxae, anterior margins of middle tibia, apical 1/4 of hind femur, hind tibia except for subapical 1/3 with yellowish brown maculae and hind tarsomeres entirely. Body hairs short and dense, silver; setae on sheath slightly long, pale yellowish brown. Wings hyaline, without smoky macula, stigma and veins blackish brown (Fig. 1).



Figures 1–8. *Macrophya lalashanica* Li, Liu & Wei sp. nov. ♀, holotype. 1. Female adult, dorsal view; 2. Head of female, dorsal view; 3. Head of female, anterior view; 4. Antenna of female; 5. Mesopleuron and metapleuron of female; 6. Ovipositor sheath, dorsal view; 7. Lancet; 8. The 10th–12th middle serrulae.

Dorsum of head strongly shiny, frontal area sparsely punctured, large area nearly smooth, microsculpture fine; inner side of temple with small smooth area, without clear punctures or microsculpture (Fig. 2); labrum and clypeus shiny, with some shallow punctures, microsculpture fine (Fig. 3). Mesonotum less shiny, with some shallow punctures, between punctures with smooth interspaces, microsculpture fine; mesoscutellum shiny, peak with some large punctures, microsculpture not clear; mesoscutellar appendage dull, lateral sides with some large punctures shallowly, microsculpture clear; metascutellum less shiny, without clear punctures, microsculpture fine. Mesopleuron less shiny, mesepisternum with coarse punctures slightly, but not dense, interspaces between punctures smooth clearly, upper half with large punctures, lower half with minute punctures; anepimeron dull, with coarse and dense wrinkles; anterior margin of katepimeron smooth and shiny strongly, without puncture or microsculpture, large area of katepimeron with some large punctures and clear microsculpture; metepisternum dull, with slightly dense and minute punctures, microsculpture fine; metepimeron less shiny, center parts with weak microsculpture and punctures, dorsal margins and posterior corner largely with distinct microsculpture (Fig. 5). All abdominal terga slightly shiny, two lateral sides of abdominal tergum 1 with large shallow punctures, microsculpture fine, central parts of abdominal tergum 1 nearly smooth; other abdominal terga with minute and shallow punctures, microsculpture weak. Hind coxa with slightly dense and coarse punctures, interspaces between punctures with fine microsculpture. Surface of sheath coriaceous, with indistinct punctures and fine microsculpture.

Middle parts of labrum elevated, anterior margin of labrum truncate; clypeus subsquare, base broader than distance between lower corners of eyes; lateral sides slightly convergent forward, anterior margin shallowly incised to approximately 3/8 length of clypeus, lateral corners long and narrow, lobe margin acute (Fig. 3); malar space 0.6 times as broad as diameter of middle ocellus; frontal area weakly elevated, as high as top of eyes in lateral view; middle fovea round shallowly, lateral foveae slightly deep, furrow-like; interocellar furrow distinct, postocellar furrow indistinct; top of ocellus slightly higher than top of eyes; POL : OOL : OCL = 10 : 17 : 16; postocellar area slightly elevated, 1.4 times broader than long (25: 16); lateral furrow slightly broad and deep, divergent backwards; head narrowed behind eyes in dorsal view, occipital carina complete. Antenna not slender, as long as head and thorax together, slightly shorter than abdomen; antennomere 2 approximately 1.2 times as long as breadth (18 : 15), antennomere 3 approximately 1.76 times as long as antennomere 4 (88 : 50), slightly shorter than antennomeres 4 and 5 together (88 : 95), middle antennomeres weakly inflated, subapical antennomeres weakly compressed, the ratio of antennomeres 4–9 = 50 : 45 : 40 : 35 : 30 : 42 (Fig. 4). Median mesoscutal groove clear, notaulus deep. Mesoscutellum roundly elevated, without carina and peak, as high as top of mesonotum in lateral view; mesoscutellar appendage with short and obtuse middle carina; metascutellum with short and lower carina; dorsal-posterior platform of mesepimeron approximately 0.8 times as broad as diameter of middle ocellus; metepimeron without appendage; distance between cenchri 2 times breadth of a cenchrus; mesopleuron and metapleuron as shown in Fig. 5. Inner tibial spur of hind leg 0.63 times the length of hind tarsomere 1 (5 : 8), hind tarsomere 1 slightly slender, slightly longer than following 4 tarsomeres together (20 : 19); claw with inner tooth slightly longer than outer tooth. Ovipositor sheath approximately 1.15 times longer than hind tarsomere 1 (23 : 20), apical sheath slightly shorter than basal sheath (25 : 27), setae on sheath slightly curved in

dorsal view, apical margin round in lateral view (Fig. 6). Fore wing with crossvein cu-a joining cell 1M at basal 1/3, crossvein 2r joining cell 2Rs at apical 1/4, cell 2Rs slightly longer than cell 1Rs, anal cell with a long petiole, 0.5 times longer than crossvein 1r-m; petiole of anal cell in hind wing about 0.2 times longer than crossvein cu-a, crossvein cu-a oblique. Lancet with 31 serrulae (Fig. 7), lancet slightly flat, middle serrulae each with 1 proximal and 7–8 distal teeth, subbasal teeth clear and small, annular spine bands slightly broad, the 10th–12th serrulae at basal as shown in Fig. 8.

Male. Unknown.

Holotype. ♀, **China**, Taiwan, Taoyuan Hsien, Mt. Lalashan, 14-V-1990, C.-C. Lo.

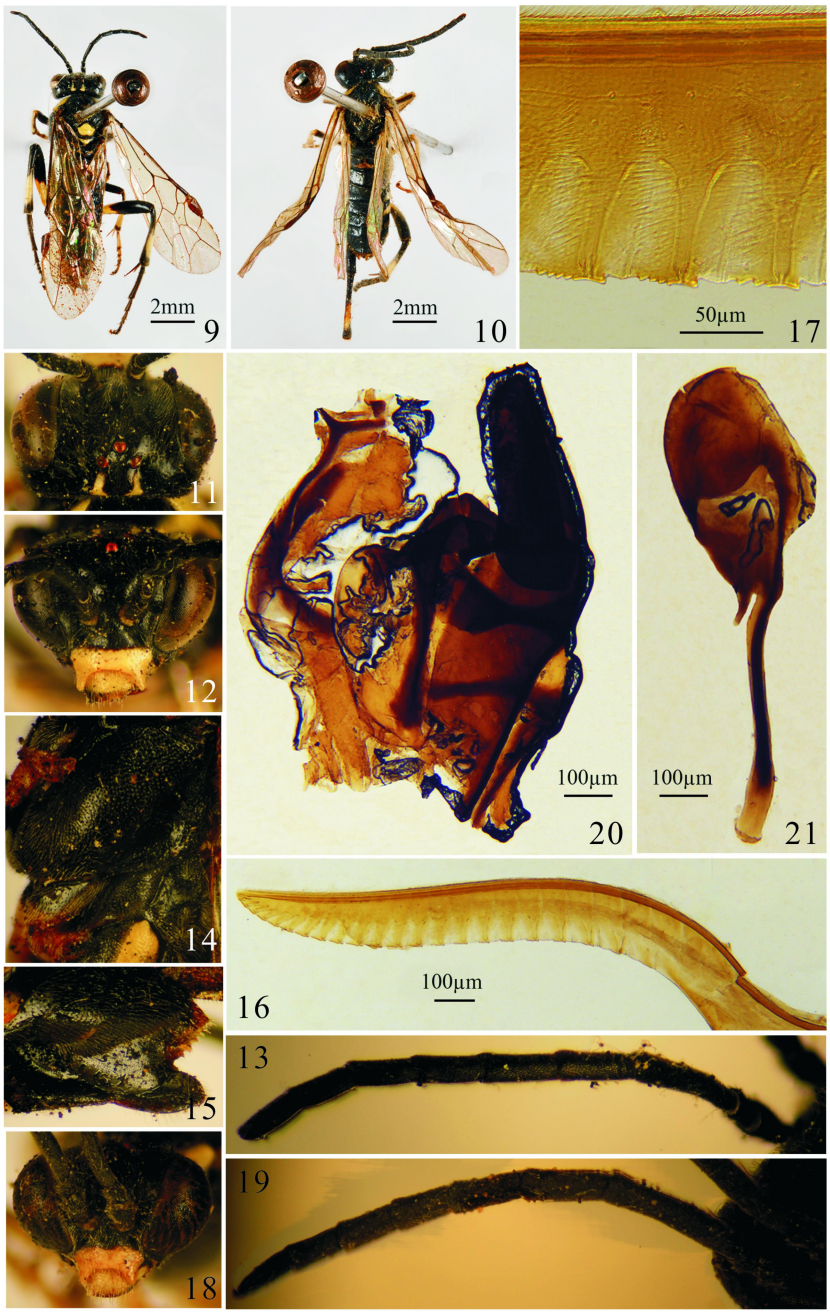
Etymology. The species epithet "*lalashanica*" is derived from the locality referring to this new species having been collected at Mt. Lala, Taiwan, China.

Remarks. In this group, this new species is very similar to *M. verticalis tonkinensis* Malaise, 1945 from Yunnan, China and Vietnam, but differs from the latter in having antennae not entirely black, scape largely yellow, outer side with black maculae ; posterior margin of postocellar area and two lateral sides with narrow cross maculae yellow; dorsum of head strongly shiny, frontal area sparsely punctured, large area nearly smooth, microsculpture fine; metepisternum entirely yellow, center at anterior margin of katepimeron and center of metepimeron with small yellow maculae; basal margin of hind coxa with black macula, apical 1/4 of hind femur with black macula, hind tarsomeres entirely black; anal cell in fore wing with a long petiole, shorter than crossvein 1r-m; middle serrulae each with 1 proximal and 7–8 distal teeth, subbasal teeth clear and small. In *M. verticalis tonkinensis*, scape entirely yellow; two lateral sides with cross maculae and postocellar area yellow; dorsum of head less shiny, with slightly dense punctures, interspaces between punctures narrow; posterior corner of metepisternum yellow, katepimeron and metepimeron entirely black; basal parts largely of hind coxa black, apical 2/5 of hind femur black, hind tarsomeres largely yellow, basal 3/4 of hind tarsomere 1 black; anal cell in fore wing as long as vein 1r-m; middle serrulae without clear subbasal tooth, very weak and not clear.

Distribution. China (Taiwan).

2. ***Macrophya hejunhuai*** **Li, Liu & Wei sp. nov.** (Figs. 9–21)

Female. Body length 9 mm. Body largely black; palp largely shallow brown; following parts yellow to yellowish white: basal half of mandibles, labrum, clypeus, lateral sides with vertical maculae of postocellar area; large maculae in two lateral corners of pronotum; outer margins of tegula, mesoscutellum, mesoscutellar appendage, lateral sides of metascutellum, a small macula at center of mesepisternum, a small macula on posterior corner of metepisternum, posterior margin at center of abdominal tergum 1, two lateral sides with long triangular maculae of abdominal terga 2–7, center parts of abdominal tergum 10, basal margin and outer side with a small macula of fore coxa, base and outer side with stripes of middle coxa, base and outer side with an oval macula basally of hind coxa, all trochanters, basal margin and apex on anterior side of fore femur, basal margin and apex with a small macula on anterior side of middle femur, basal half of hind femur, fore and middle tibiae except for outer sides with black maculae, subapical 2/5 long macula on dorsal side of hind tibia, fore and middle tarsomeres largely. Body hairs short and dense, silver; setae on sheath slightly long, pale yellowish brown. Wings hyaline, without smoky macula, stigma and veins blackish brown (Fig. 9).



Figures 9–21. *Macrophya hejunhuai* Li, Liu & Wei sp. nov. 9. Adult female, dorsal view, holotype; 10. Adult male, dorsal view, paratype; 11. Head of female, dorsal view, holotype; 12. Head of female, anterior view, holotype; 13. Antenna of female, holotype; 14. Mesopleuron and metapleuron of female, holotype; 15. Ovipositor sheath, lateral view, holotype; 16. Lancet, holotype; 17. The 8th–10th serrulae, holotype; 18. Head of male, anterior view, paratype; 19. Antenna of male, paratype; 20. Gonoforceps, paratype; 21. Penis valve, paratype.

Dorsum of head shiny, frontal area sparsely punctured, large area nearly smooth, microsculpture fine; inner side of temple with small smooth area, without clear punctures or microsculpture (Fig. 11); labrum and clypeus shiny, with some shallow punctures, microsculpture fine (Fig. 12). Mesonotum less shiny, with some shallow punctures, interspaces between punctures smooth, microsculpture fine; mesoscutellum less shiny, peak with some shallow punctures, microsculpture not clear; mesoscutellar appendage dull, lateral sides with some large punctures shallowly, microsculpture clear; metascutellum less shiny, without clear puncture, microsculpture fine. Mesopleuron less shiny, mesepisternum with coarse punctures slightly, but not dense, interspaces between punctures smooth clearly, upper half with large punctures, lower half with minute punctures; anepimeron dull, with coarse and dense wrinkles; anterior margin of katepimeron smooth and shiny strongly, without punctures or microsculpture, middle depressed area of katepimeron without punctures, but microsculpture clear, posterior area with some large punctures, dorsal margins with coarse punctures; metepisternum dull, with slightly dense and minute punctures, microsculpture fine; metepimeron less shiny, center parts with weak microsculpture and punctures, dorsal margins and posterior corner largely with distinct microsculpture (Fig. 14). All abdominal terga less shiny, two lateral sides of abdominal tergum 1 with large shallow punctures, microsculpture fine, central parts of abdominal tergum 1 nearly smooth; other abdominal terga with minute and shallow punctures, microsculpture weak. Hind coxa with slightly dense and coarse punctures, interspaces between punctures with fine microsculpture. Surface of sheath coriaceous, with indistinct punctures and fine microsculpture.

Middle parts of labrum elevated, anterior margin of labrum truncate; clypeus subsquare, base broader than distance between lower corners of eyes; lateral sides slightly convergent forward, anterior margin shallowly incised to approximately 5/14 length of clypeus, lateral corners long and narrow, lobe margin acute (Fig. 12); malar space 0.5 times as broad as diameter of middle ocellus; frontal area weakly elevated, as high as top of eyes in lateral view; middle fovea round shallowly, lateral foveae slightly deep, furrow-like; interocellar furrow distinct, postocellar furrow indistinct; top of ocellus slightly higher than top of eyes; POL : OOL : OCL = 8 : 15 : 10; postocellar area slightly elevated, 2 times broader than long; lateral furrow slightly broad and deep, divergent backwards; head narrowed behind eyes in dorsal view, occipital carina complete. Antenna not slender, as long as head and thorax together, clearly shorter than abdomen; antennomere 2 approximately 1.4 times as long as breadth (10 : 7), antennomere 3 approximately 1.63 times as long as antennomere 4 (70 : 43), slightly shorter than antennomeres 4 and 5 together (70 : 83), middle antennomeres weakly inflated, subapical antennomeres weakly compressed, the ratio of antennomeres 4–9 = 43 : 40 : 37 : 36 : 30 : 27 (Fig. 13). Median mesoscutal groove clear, notaulus deep. Mesoscutellum roundly elevated, without middle carina, but with weak peak and posterior carina, slightly higher than top of mesonotum in lateral view; mesoscutellar appendage with short and obtuse middle carina; metascutellum with short and lower carina; dorsal-posterior platform of mesepimeron approximately 0.8 times as broad as diameter of middle ocellus; metepimeron without appendage; distance between cenchri 2 times breadth of a cenchrus; mesopleuron and metapleuron as shown in Fig. 14. Inner tibial spur of hind leg 0.7 times the length of hind tarsomere 1 (25 : 36), hind tarsomere 1 slightly slender, slightly longer than following 4 tarsomeres together (9 : 10); claw with inner tooth slightly shorter than outer tooth. Ovipositor

sheath slightly shorter than hind tarsomere 1 (11 : 12), apical sheath slightly longer than basal sheath (7 : 6), setae on sheath slightly curved in dorsal view, apical margin round in lateral view (Fig. 15). Fore wing with crossvein cu-a joining cell 1M at basal 1/3, crossvein 2r joining cell 2Rs at apical 2/5, cell 2Rs longer than cell 1Rs, anal cell with a long petiole, 1.5 times longer than crossvein 1r-m, slightly shorter than vein cu-a; petiole of anal cell in hind wing about 0.5 times longer than crossvein cu-a. Lancet with 22 serrulae (Fig. 16), lancet slightly flat, middle serrulae each with 1 proximal and 3–5 distal teeth, subbasal teeth large and short, annular spine bands slightly broad, the 8th–10th serrulae at base as shown in Fig. 17.

Male. Body length 7 mm (Fig. 10); body color and structure similar to female, but following parts: postocellar area and mesoscutellum entirely black; fore and middle coxae except for basal margins with black maculae, ventral side largely of hind coxa, fore and middle femur except for outer side with black stripes, fore and middle tibiae nearly yellowish white; anterior view of male as shown in Fig. 18; antennae in lateral view as shown in Fig. 19; gonoforceps as shown in Fig. 20; penis valve as shown in Fig. 21.

Holotype. ♀, **China**, Zhejiang, Mt. Tianmu, Xianrending, alt. 1250–1547 m, 06–07-VI-1989, Junhua HE leg. **Paratypes.** 2♀1♂, same data as holotype; 1♀, Zhejiang, Mt. Tianmu, Xianrending, 02–04-VI-1990.

Etymology. The species epithet "*hejunhuai*" is derived from the name of the collector of the new species: Mr. Junhua HE.

Remarks. In this group, this new species is very similar to *M. acuminiclypeus* Zhang & Wei, 2006, but differs from the latter in having dorsum of head shiny, frontal area sparsely punctured, large area nearly smooth, microsculpture fine; lateral vertical maculae of postocellar area yellow; posterior margin at center of abdominal tergum 1 and two lateral sides with long triangular maculae of abdominal terga 2–7 yellowish white. In *M. acuminiclypeus*, dorsum of head dull, frontal area coarsely and densely punctured, interspaces between punctures narrow, microsculpture clear; two lateral cross maculae of postocellar area yellow; posterior margin and lateral corners of abdominal tergum 1 with large maculae, posterior bands in two lateral sides of abdominal terga 2–5 (band approximately 2/5 times broader than every tergum), posterior margin of abdominal tergum 6 and triangular maculae at center of abdominal terga 7–8 yellowish white.

Distribution. China (Zhejiang).

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